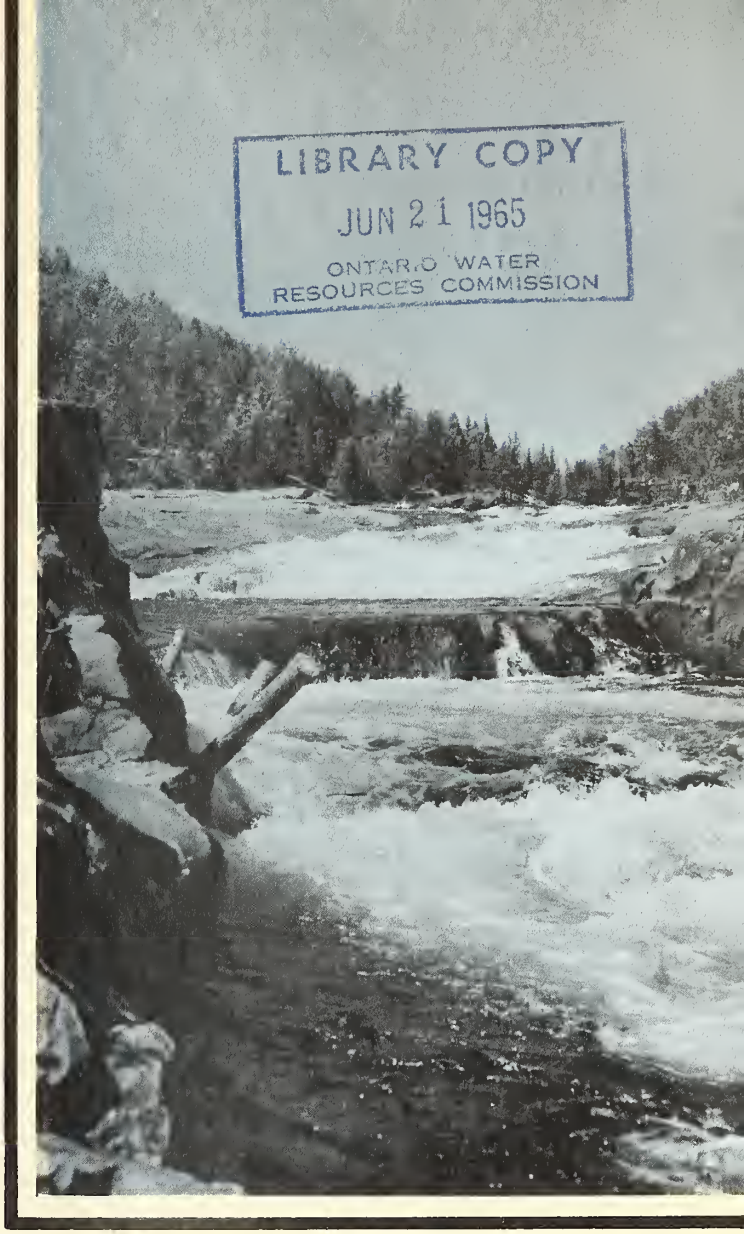
Brampton-Chinguacousy Sewage Treatment Plant



1963 Annual Report

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Town of Brampton.

Reeve and Members of
Local Advisory Committee,
Township of Chinguacousy.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Brampton-Chinguacousy Sewage Treatment Plant, OWRC Project No. 58-S-14, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

D. S. Caverly,
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Brampton-Chinguacousy Sewage Treatment Plant, OWRC Project No. 58-S-14 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer,
Director,
Division of Plant Operations.

foreword

This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipalities, through representatives on the Local Advisory Committee, have given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.

B. C. Palmer,
Director,
Division of Plant Operations

DIVISION OF PLANT OPERATIONS

contents

Mr. C. W. Perry
Assistant Director
Mr. A. C. Beattie
Regional Supervisor
Mr. A. Clark
Operations Engineer

THE BRAMPTON-CHINGUACOUSY SEWAGE TREATMENT PLANT

OPERATED FOR

THE TOWN OF BRAMPTON,

AND

THE TOWNSHIP OF CHINGUACOUSY

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q. C.

J. H. H. Root, M.P.P.

J. A. Vance, LL. D.

A. A. Wishart, Q. C., M.P.P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert

L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1956 to 1963 History

INCEPTION

In 1956, the Town of Brampton commenced discussions with the Ontario Water Resources Commission for the construction of a sewage treatment plant in the northern end of the Township of Toronto. Proctor and Redfern were the consulting engineers for the scheme.

APPROVAL

In 1958, the Town of Brampton entered into an agreement with the OWRC for the financing, construction and operation of the plant.

CONSTRUCTION

Andeen Construction Limited of Brampton received the contract for the construction of a 1 MGD sewage treatment plant in August 1958 and work commenced soon afterwards.

The Commission commenced operation of this project in January of 1960.

TOTAL COST

The total cost of the project was $992,500.00. This includes the trunk sanitary sewers and plant water main.

Truline Construction Company Limited completed a 1 MGD extension to the plant in September 1963. Final costs are not yet available.

Project Staff

CHIEF OPERATOR

Mr. Irving Greggory joined the Commission on January 25th, 1960 as an operator at the Brampton plant. He later became Chief Operator, in which capacity he has proved capable and conscientious.

OPERATOR

Mr. A. P. Friesen joined the staff at the Brampton plant in April 1960 as an operator. Prior to joining the Commission, Mr. Friesen was employed as a carpenter. Mr. Friesen has proved to be an able operator.

OPERATOR

Mr. D. J. Bailie joined the Brampton staff in May 1962 and like Mr. Greggory and Mr. Friesen has proved to be a capable and reliable employee.

Description of Project

INFLUENT WORKS

The waste water enters the plant through two gravity sewers, 42" and 27" in diameter. There is also a 10" forcemain from Bramalea. It is then screened to remove large objects and passed through a barminutor which screens and shreds the larger particles to a size suitable for handling in the treatment plant. From this point, it flows to the primary sedimentation tanks.

PRIMARY SEDIMENTATION TANKS

The two primary sedimentation tanks are designed to provide an adequate detention period to allow the heavier solids to settle out, and for the removal of surface scum and grease. The heavier solids which settle out to the bottom of the tank and surface scum are collected by a scraper mechanism and withdrawn to a sludge pit from where it is pumped to the primary digester.

The primary sedimentation tanks are designed to provide sufficient detention to allow removal of 30-35% of the heavy organic material.

The settled waste water flows over the effluent weirs and discharges to the aeration tanks.

AERATION

Settled sewage flows from the primary sedimentation tanks to the four aeration sections. There it is mixed with activated sludge which is returned from the final sedimentation tanks and aerated.

The aeration sections retain the sewage for 8 hours at a flow of 2.0 million gallons per day. Air is supplied by three blowers with a usable capacity of 1700 cubic feet of air per minute, and a standby capacity of 850 cubic feet per minute.

FINAL SEDIMENTATION

The aerated mixed liquor from the aeration sections is retained in four final sedimentation tanks for 2 3/4 hours at design flow. This allows the activated sludge to settle. It is collected from the bottoms of the tanks and returned to the aeration sections. (Excess activated sludge is returned to the primary sedimentation tanks and is pumped from there to the digesters.) The remaining liquid flows over the weirs of the final sedimentation tanks to the chlorine contact chamber.

DIGESTION

Sludge digestion in this plant is performed in two stages, called primary and secondary digestion.

The sludge from the primary tanks is pumped, with excess activated sludge to the primary digester. In the absence of air, and in a regulated temperature of 90^{o} F., the decomposing or digestion process begins. Constant agitation within the tank ensures overall treatment.

The raw sludge is broken down by anaerobic bacterial action and, when thoroughly digested, is a thick, black, odourless liquid.

The secondary digester receives the digested material from the primary and completes the process. The secondary digester is not agitated but is allowed to be quiescent. The supernatant is decanted and returned to the treatment process.

Sludge gas, principally methane, formed during the process is used as a fuel for the heat exchanger and boiler supplying heat to the digester and buildings. Oil is used as standby fuel.

CHLORINATION

From the final sedimentation tank the effluent flows to a chlorine contact chamber where it is chlorinated to reduce the bacterial count to within acceptable limits. It is then discharged to the Etobicoke Creek.

Design—Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 20,000 persons.

Design Plant Flow - 2 MGD

Per Capita Flow - 100 GPD

Five Day BOD -

Raw Sewage	-	220 PPM
Removal	-	90%

Suspended Solids -

Raw Sewage	-	250 PPM
Removal	-	95%

PRIMARY TREATMENT

COARSE SCREENING

Comminution

24" Model B barminutor.

Grit Removal

Air degrittor, five minute detention.

PRIMARY SEDIMENTATION TANK

Two clarifiers - 42 ft. square by 10 ft. deep.

Detention Period - 2 hours 30 minutes.

Surface Settling Rate - 700 gallons per square foot of tank per day.

Overflow Rate - 6750 gallons per lineal foot of weir per day.

SECONDARY TREATMENT

Four aeration tanks.

Total Capacity - 136,800 cubic feet.

Detention Period - 8 hours.

Return Sludge - 75%.

Air supply one cubic ft. per gallon.

Three cyclo-blowers - 850 cfm capacity each.

FINAL SEDIMENTATION TANKS

Four clarifiers - 32 ft. square x 10 ft. deep.

Detention Period - 2 hours 45 minutes.

Surface Settling Rate - 550 gallons per sq. ft. of tank per day.

Weir Overflow Rate - 4720 gallons per lineal foot of weir per day.

CHLORINE CONTACT CHAMBER

30 ft. x 15 ft. x 7 ft. (L. W. D).

Detention Period - 15 minutes.

Chlorinator Capacity - 100 lbs per 24 hours.

DIGESTER

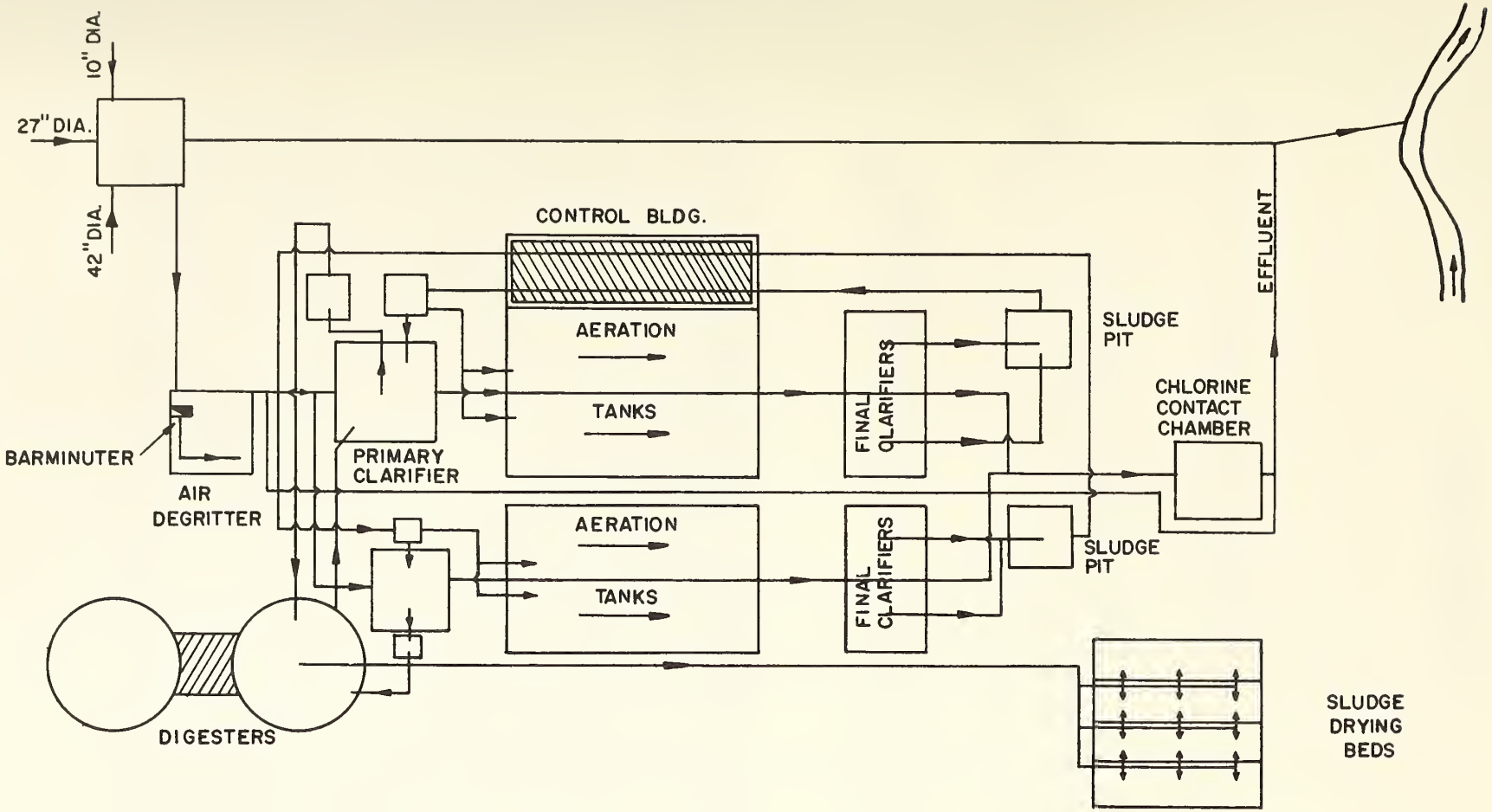
Two stage digestion.

Two tanks - 50 ft. in diameter x 20 ft. deep.

Capacity - 3.33 cubic feet per capita.

Loading - 2.25 lbs. solids per cubic foot of tank per month.

Sludge drying beds 1.87 sq. ft. per capita.



— BRAMPTON OWRC SEWAGE TREATMENT PLANT —

FLOW DIAGRAM

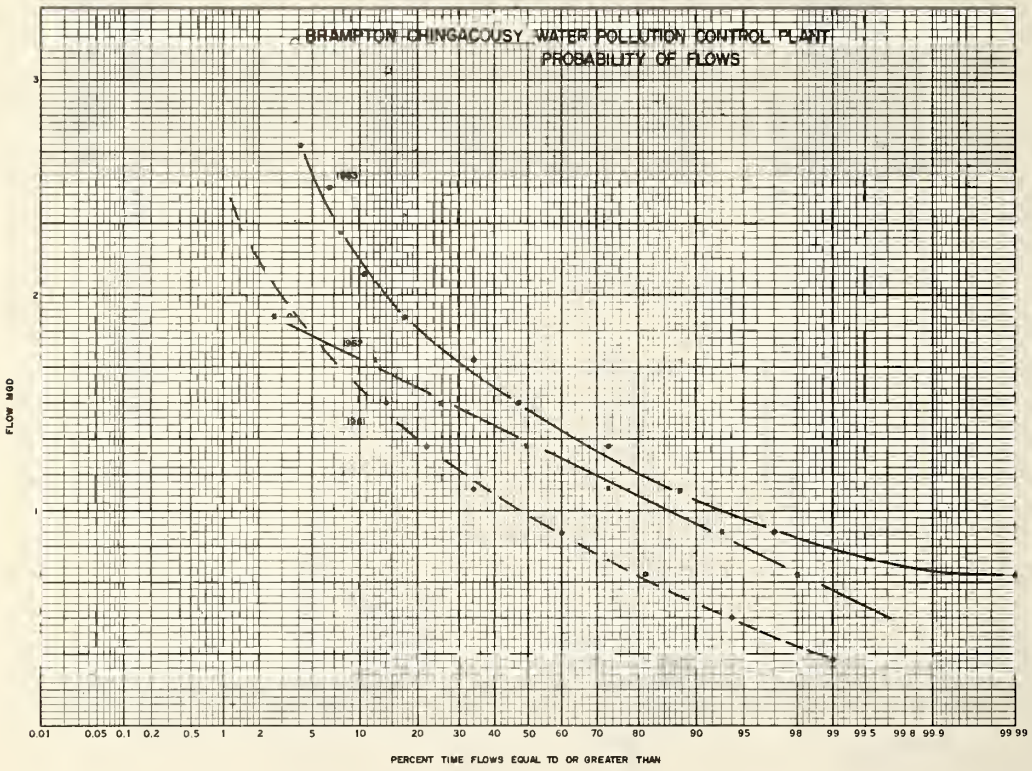
Process Data

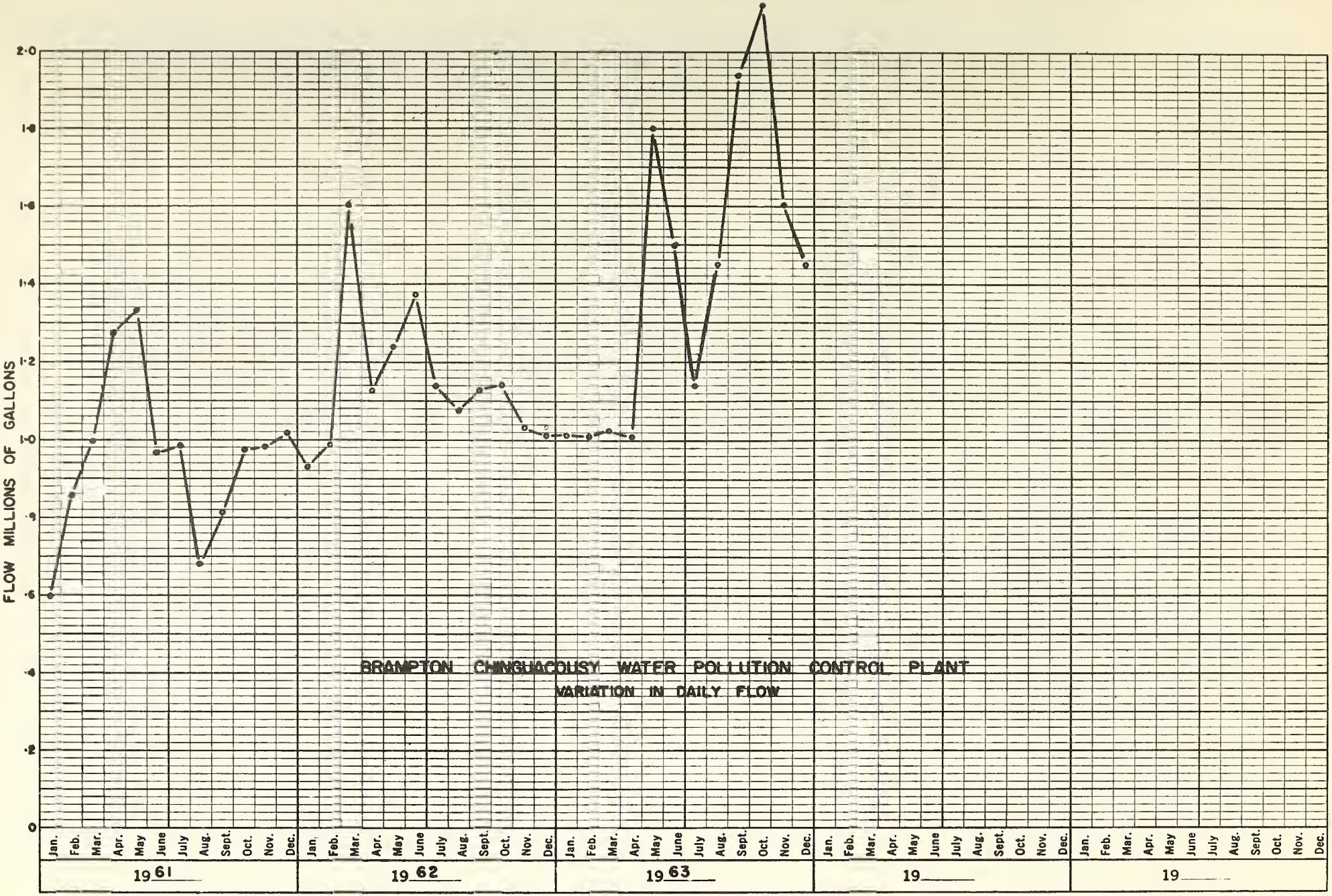
FLOW

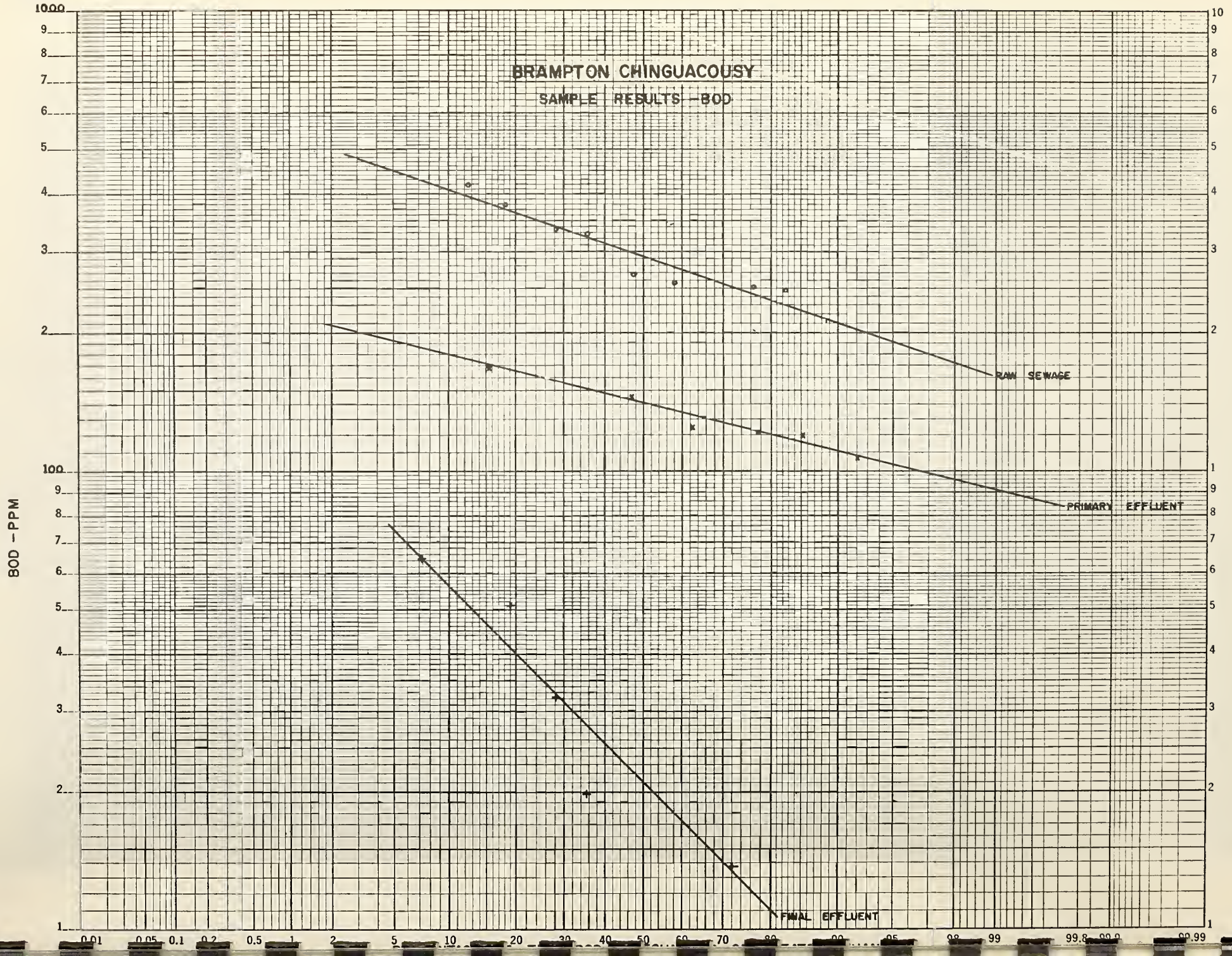
During 1963, the Brampton-Chinguacousy plant handled a total of 539 million gallons, an increase of 21% over the flow of 444 million gallons recorded in 1962.

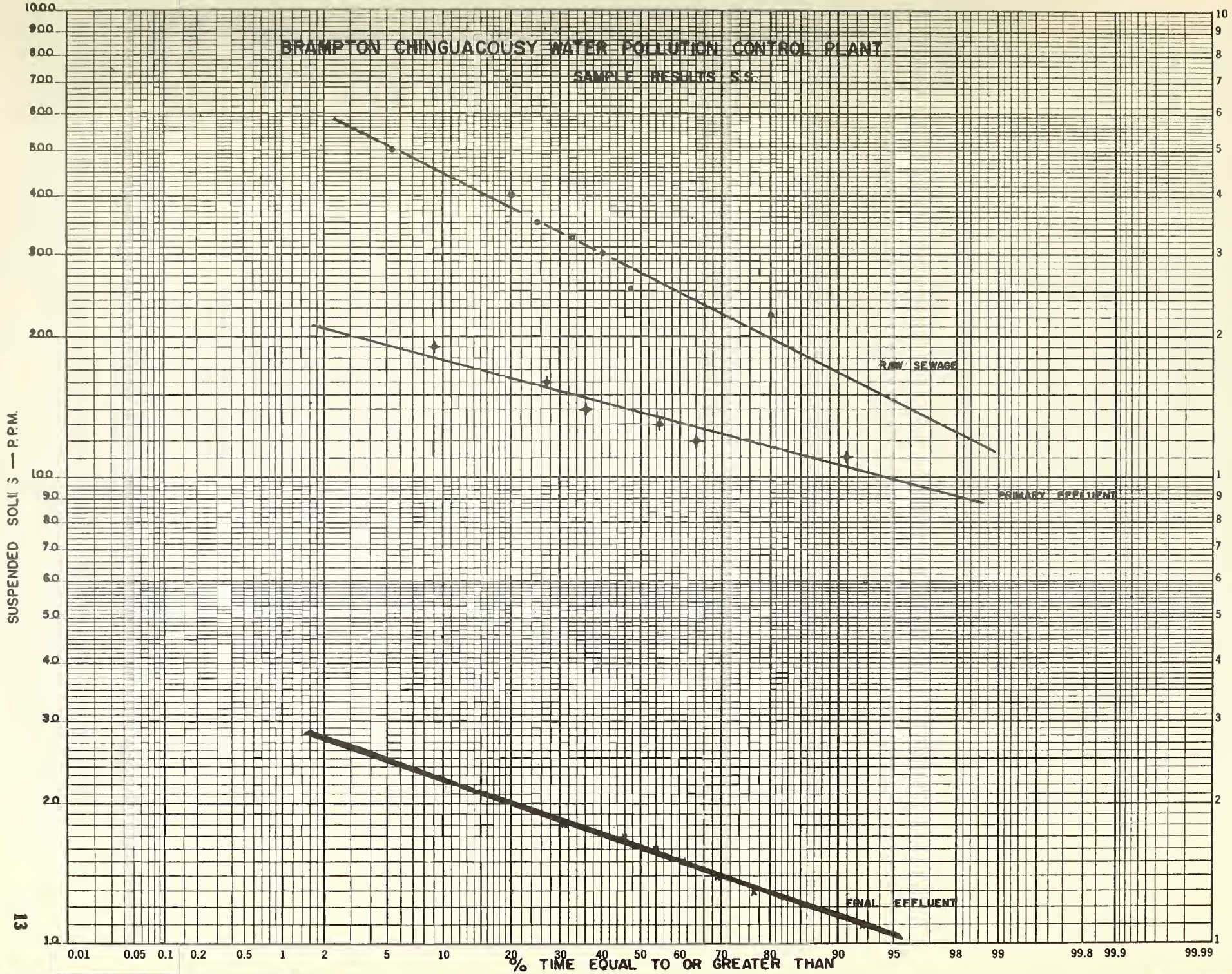
During the first eight months of 1963, prior to placing the extension in operation, the recorded flow was 318 million gallons, an increase of 10% over the flow for the same period in 1962. However, after the extension was placed in operation, an increase of 40% was observed for the last four months over that recorded in 1962.

The maximum 24 hour flow recorded in 1963 was 2.934 million gallons registered on May 24th. The maximum monthly flow for the year occurred during the month of October when 66.44 million gallons were treated.




FLOW MILLIONS OF GALLONS
2·0
1·8
1·6
1·4
1·2
1·0
·8
·6
·4
·2
0
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
19____
19____
BRAMPTON CHINGUACOUSY WATER POLLUTION CONTROL PLANT
VARIATION IN DAILY FLOW


BRAMPTON CHINGUACOUSY
SAMPLE RESULTS – BOD
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
BOD – PPM
1000
100
10
1
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99


BRAMPTON CHINGUACOUSY WATER POLLUTION CONTROL PLANT
SAMPLE RESULTS S.S.
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
SUSPENDED SOLIDS — P.P.M.
% TIME EQUAL TO OR GREATER THAN
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.									486
FEB.									459
MAR.									594
APR.									405
MAY									594
JUNE	225	60	73.5	38.2	247	96	61.0	35.0	594
JULY	335	38	88.5	57.15	329	47	85.5	54.26	621
AUG.	242	7	97.0	52.8	266	16	94.0	56.2	675
SEPT.	223	17	92.5	60.0	317	13	96.0	88.6	756
OCT.									540
NOV.	286	14	95.0	65.5	226	16	93.0	50.1	459
DEC.	325	11	96.5	70.5	513	18	96.5	111.0	540
TOTAL	1636	147	543.0	344.1	1898	206	526.0	395.16	6723
AVG.	273	24	90.5	57.3	316	34	87.7	65.86	560

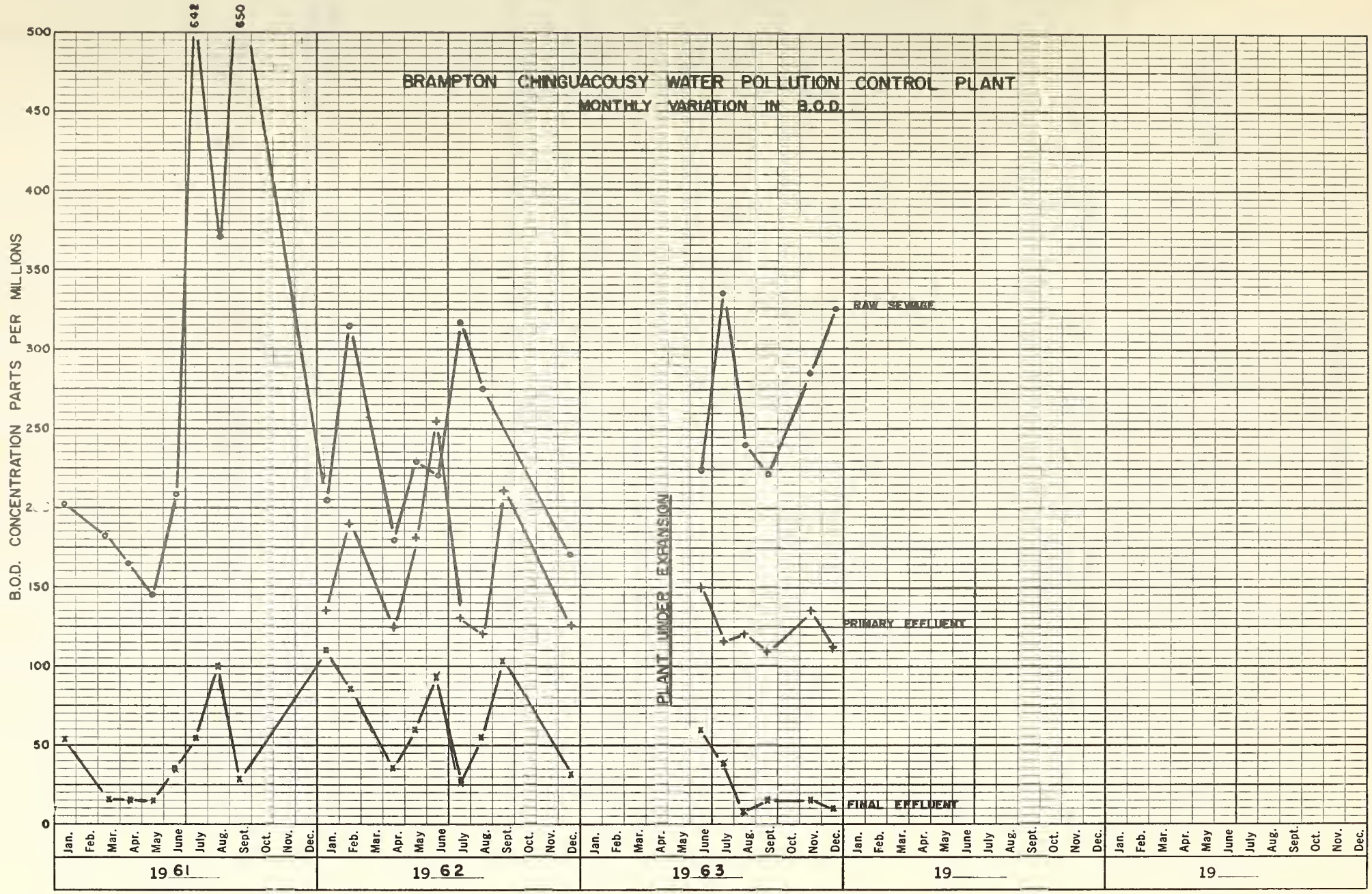
COMMENTS

An average loading of 273 PPM BOD and 316 PPM suspended solids was experienced in the raw sewage in 1963. The average BOD and suspended solids in the final effluent was 24 PPM and 34 PPM respectively, both being in excess of the OWRC objective of 15 PPM.

The average efficiencies obtained during the year, however, were 90.5% BOD removed and 87.7% suspended solids removal. These efficiencies are considered satisfactory as the construction of the plant extension interfered with the efficient operation of the plant during the initial half of 1963. The efficiencies obtained after the plant extension commenced operation were 93.6% BOD removal and 95.1% suspended solids removal, excellent efficiencies for this plant.

During 1963, 6723 cubic feet of grit was removed at the Brampton plant. This represents an average of 12.5 cubic feet per million gallons of raw sewage treated. This figure is higher than the average for similar installations in North America.

The disposal of this grit has presented a problem and consideration is being given to means of having it disposed of daily.


BRAMPTON CHINGUACOUSY WATER POLLUTION CONTROL PLANT
MONTHLY VARIATION IN B.O.D.
B.O.D. CONCENTRATION PARTS PER MILLIONS
642
650
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
PLANT UNDER EXPANSION
500
450
400
350
300
250
150
100
50
0
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
19 61
19 62
19 63
19
19

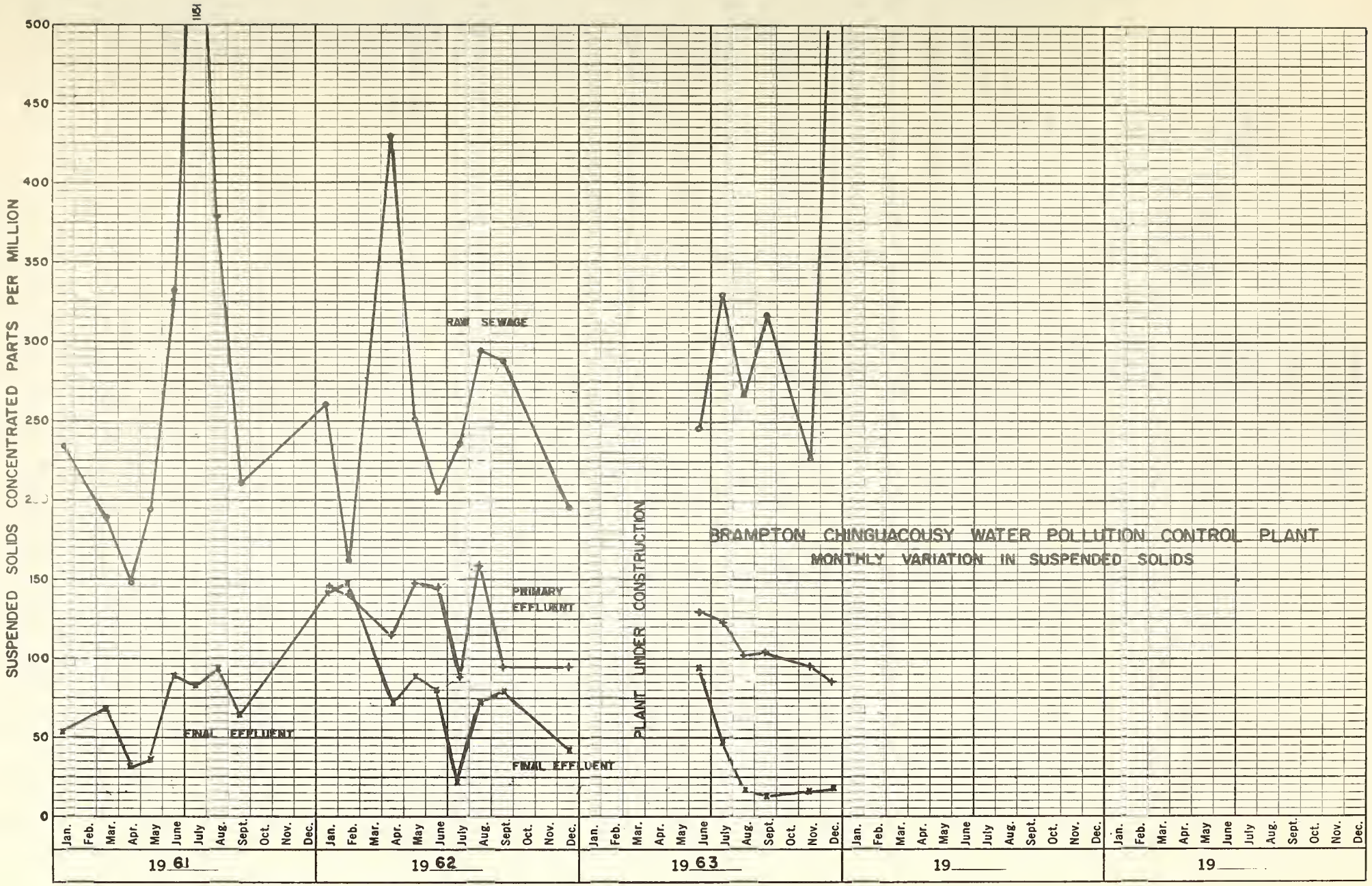
AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY		582		
FEBRUARY				
MARCH				
APRIL				
MAY				
JUNE	150	686	114	905
JULY	115	729	60	2225
AUGUST	121	723	87	1443
SEPTEMBER	109	752	102	1360
OCTOBER		547		
NOVEMBER	160	775	114	1077
DECEMBER	112	828		
TOTAL				
AVERAGE	153	735	95	1402

COMMENTS

Data concerning the aeration performance during 1963 is incomplete as the construction of the plant extension intefered with the proper operation and control of the plant during the initial half of the year.

The BOD and MLSS ratio was somewhat higher than ideal but the efficiency obtained indicates that satisfactory results were obtained indicates that satisfactory results were obtained in spite of this.


BRAMPTON CHINGUACOUSY WATER POLLUTION CONTROL PLANT
MONTHLY VARIATION IN SUSPENDED SOLIDS
SUSPENDED SOLIDS CONCENTRATED PARTS PER MILLION
500
450
400
350
300
250
200
150
100
50
0
1151
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
FINAL EFFLUENT
PLANT UNDER CONSTRUCTION
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
19 61
19 62
19 63
19
19

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	34.377	NIL	
FEBRUARY	30.742	NIL	
MARCH	38.638	NIL	
APRIL	32.019	1660*	6.3*
MAY	55.823	1640	2.9
JUNE	46.320	2390	5.2
JULY	38.481	3657	9.5
AUGUST	44.965	1604	3.5
SEPTEMBER	58.260	1174	2.0
OCTOBER	66.442	2369	3.5
NOVEMBER	48.186	1525	3.2
DECEMBER	44.920	990	2.2
TOTAL	539.173	17,000	
AVERAGE	44.931		4.0

COMMENTS

During 1963, the Division of Sanitary Engineering recommended that year-round chlorination of plant effluent be practiced.

During 1963, a total of 17,000 pounds of chlorine were required for an average dosage of 4.0 PPM.

1963

PLANT — **Total Operating Costs** — **MONTHLY**

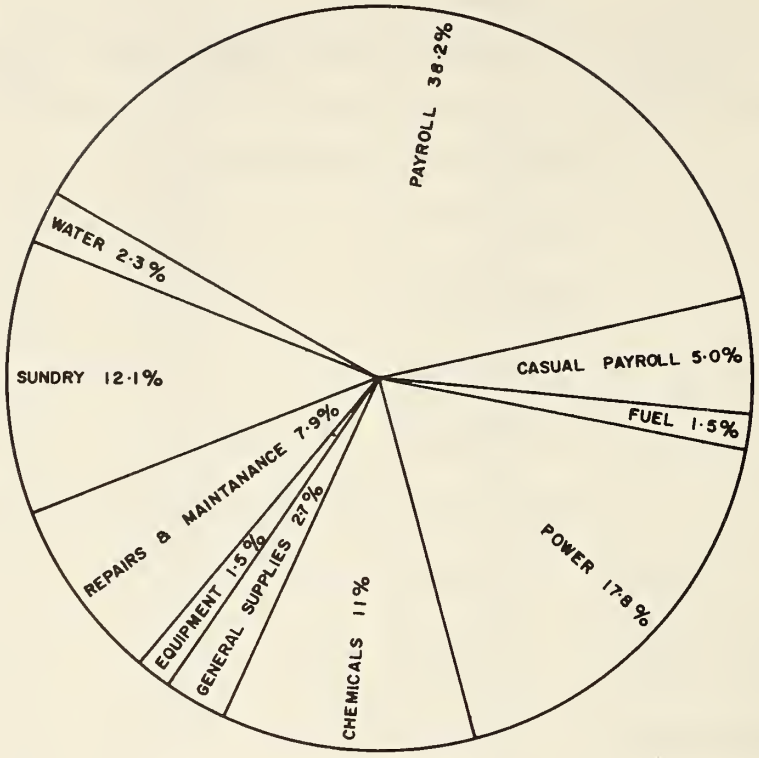
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	1474.69	940.28		100.83	401.65	(140.00)	149.60			22.33	
FEB	1639.37	940.28		50.90	414.25		106.64		75.50	51.80	
MARCH	2539.03	940.28		46.44	315.15		28.18		617.49	546.46	45.03
APRIL	1210.80	403.24		139.59	342.36		28.11	77.20	163.62	56.68	
MAY	2026.90	960.20			325.13	469.56	24.14		53.72	165.16	28.99
JUNE	2410.63	805.26		43.74	372.98	638.44	90.74	349.94	15.50	31.36	62.67
JULY	3248.98	1330.11	229.80		688.66	829.80	48.23		91.88	30.41	
AUG	2723.53	793.91	218.88		445.88	518.05	48.32		77.80	408.55	212.34
SEPT	1273.20	896.63	126.44		466.48	(350.00)	73.84			59.81	
OCT	3882.11	819.77	231.00		562.27	798.05	65.00		756.15	44.61	205.26
NOV	3672.25	832.15	260.83		601.26	(175.00)	46.37		181.85	1987.19	(62.20)
DEC	3352.62	1484.74	373.84	93.15	259.08	623.05	84.73		167.51	92.34	179.18
TOTAL	29,054.11	11,146.65	1,440.79	474.65	5,195.15	3,212.04	793.90	427.14	2,201.02	3496.50	667.27

PLANT — **YEARLY**

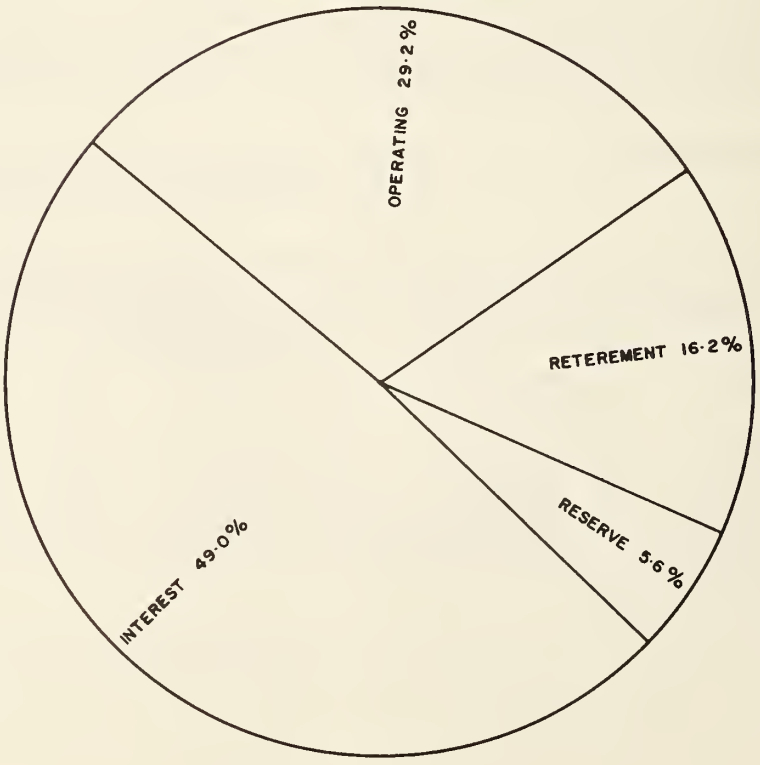
YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR *
1961	345.128	$25,295.74	$73.30	$1.45
1962	441.847	$27,441.44	$ 62.20	$1.43
1963	539.173	$29,054.11	$ 53.90	$1.31

* BASED ON ASSESSED POPULATION 26,191

1963 OPERATING COSTS



TOTAL ANNUAL COST



SUMMARY

This report has given in detail significant data on the operation of the various treatment units at the Brampton-Chinguacousy Sewage Treatment Plant.

The major item of note during 1963 was the completion of the plant extension and the improved efficiency obtained after it was placed in operation.

The capacity of the plant, although increased to two million gallons per day, is still overloaded and problems associated with overloaded plants can be expected until the plant is further enlarged.

Total 1963 Costs

The total cost to the municipality for the year 1963 was as follows:

Operating	$ 29,054.11*
Debt Retirement	$ 19,334.00
Reserve	$ 6,667.00
Interest	$ 58,931.72
TOTAL	$ 119,650.54

On the basis of the population served by this plant (20,000), the per capita cost of this project was $5.98.

As of December 31st, 1963, there was a total of $27,159.49 in the Reserve Fund.

The operating costs per million gallons of sewage treated was $64.37 in 1963.

*Excluding Bramalea Pumping Station.

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY ST. TORONTO 5